



# Castilleja

*A Publication of the Wyoming Native Plant Society*

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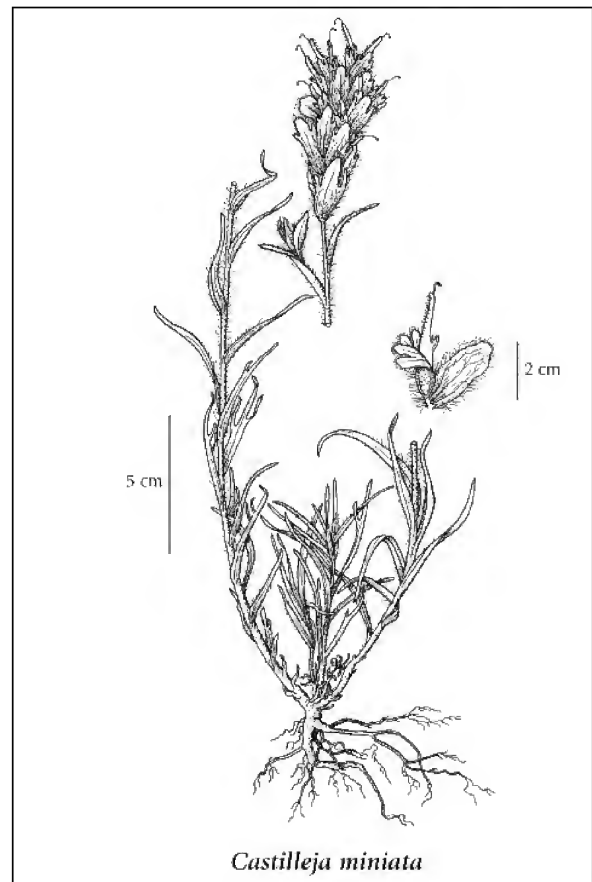
## **Alternate Hosts of White Pine Blister Rust**

[Excerpts from McDonald et al. In Press, Zambino et al. 2005]

In 2004, naturally-occurring infections of white pine blister rust (*Cronartium ribicola*), an introduced pathogen, were discovered in northern Idaho on the species *Pedicularis racemosa* and *Castilleja miniata* in the Figwort family (Scrophulariaceae) (McDonald et al. In Press). The ability of these species, and additionally, *C. rhexilifolia* to act as alternate hosts was confirmed by laboratory inoculations using aeciospores from whitebark pine (Zambino et al. 2005).

Isolates recovered from *P. racemosa* after artificial inoculations also infected *Ribes nigrum* and western white pine seedlings, and thus were not specific to an alternate host genus.

Confirmation of these alternate hosts challenges concepts of blister rust hazard and epidemiology, particularly in upper montane to subalpine stands where the newly identified hosts are abundant. The use of these alternate hosts also suggests a new avenue for fungal adaptation and pathogen - driven ecosystems. Further research aims to determine the geographic extent of infections in Scrophulariaceae hosts, their role in white pine blister rust epidemiology, and the genetic basis for infection.



*Castilleja miniata*

Above: *Castilleja miniata*. From: Douglas, G. W. et al. 2000. Illustrated Flora of British Columbia, Vol. 5. Posted by: Klinkenberg, Brian. (Editor). 2005. E-Flora BC. [[www.eflora.bc.ca](http://www.eflora.bc.ca)]. Lab for Advanced Spatial Analysis, Department of Geography, University of British Columbia, Vancouver.

## References

- McDonald, G.I., B.A. Richardson, P.J. Zambino, N.B. Klopfenstein, and M.-S. Kim. In Press. *Pedicularis* and *Castilleja* are Natural Hosts of *Cronartium ribicola* in North America: a First Report. Forest Pathology.
- Zambino, P.J., G.I. McDonald, B.A. Richardson, N.B. Klopfenstein, and M.-S. Kim. 2005. Natural infection of *Pedicularis* and *Castilleja* spp. by the white pine blister rust fungus *Cronartium ribicola* in North America. Phytopathology 95(6): S116

## WNPS News

Scholarship Dedication: Wyoming Native Plant Society is proud to dedicate the annual student scholarship fund for student botany research in Wyoming to the memory of Stuart Markow, who epitomized dedication and excellence in botany. This is the only scholarship expressly earmarked for Wyoming botany research. The 2006 Markow Botany Research Scholarship announcement is in this issue on p. 5.

Wyoming Native Plant Society  
P.O. Box 2500, Laramie, WY 82073

### WNPS Board - 2005

President: Bonnie Heidel	742-9523
Vice President: Laura Hudson	745-8236
Sec.-Treasurer: Ann Boelter	745-5487
Board Members: Mike Evans,	326-8217
Katherine Zacharkevics	

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email: bheidel@uwyo.edu)  
Teton Chapter: PO Box 82, Wilson, WY 83014 (Joan Lucas, Treasurer)  
Bighorn Native Plant Society: PO Box 21, Big Horn, WY 82833 (Jean Daly, Treasurer)

Reminder: The Treasurer is now recording all membership payment dates, and encourages all people who do NOT have "05" printed on the address label of this issue to catch up and renew-for-two years (2004 and 2005). ...Yes, you can also renew-ahead!

By-Laws: The WNPS By-Laws remain as last amended in 1994 because they require response of 2/3 of the membership at an annual meeting. By-Law amendments may come before the WNPS membership for consideration with 2006 renewal reminders in the next newsletter. This also means that we do not have a life membership category and that the newsletter editor has started to get Board approval for every bill over \$50, i.e., all printing and postage bills for the newsletter!

Contributors to this issue: Rick Dunne (RD), Mike Evans (ME), Walter Fertig (WF), and Bonnie Heidel (BH).

**\*\*Deadline for the next issue is November30; all news and contributions are welcome!**

New Members: Please welcome the following new members to WNPS: David Anderson (Fort Collins, CO), Nancy Bockino (Laramie), Thaddeus C. Jones (Red Lodge, MT), Sandy Leotta (Casper), Britt Long (Cheyenne), Gary Perasso (Lacey, WA), Travis Ziehl (Jackson).

Treasurer's Report: Balance as of 23 September: General Fund \$951.47; Scholarship Fund: \$940; Total Funds: \$1,891.47.



### **Message from the President**

Wyoming Native Plant Society (WNPS) is uniquely hands-off among all organizations, including native plant societies, in its claim on member alliance. There are no thinly-veiled fund-raising appeals or mass-mailings. Appreciation of Wyoming plant life is NOT the most important thing in the world (nor the most expensive), but each of us is uniquely positioned and *privileged* to know and to care about Wyoming's phenomenal plant life. The communication and collective endeavors realized through WNPS enhance individual efforts.

As plants enter fall dormancy, the life of WNPS springs into action. Newsletters appear – they are referred to as quarterly, but revolve around the growing season. I think of them as post-season and pre-season, with two dead-of-winter issues thrown in. Plans are underway for a 2006 Wyoming Plant Conservation Conference (watch for further information). The 2006 scholarship announcement is released in this issue. Also, members are invited to step up if they are willing to run on the Board to fill the one 2-year term vacancy next year (contact any Board member).

What does all of this have to do with you? ...Whatever you make of it. If you contribute to the appreciation, management or understanding of Wyoming plants and vegetation, or take a role on behalf of the equally phenomenal array of Wyoming Native Plant Society members, then it is by your choosing. During this season, remember to pause for your priorities. And please check out WNPS endeavors if priorities converge. BH

## FOCUSING BETWEEN BARB WIRE

By Mike Evans

Early last spring, I decided to compile a plant checklist for our land. This seemed like a worthy project and one that would not require that much effort. The spring of 2005 was wet and warm, and it was nice to see green grass for a change. I gathered up a notebook and some of my plant books. I started in a place where I had to go change some water, with many wetland plants. The first few plants I knew the names of, but as I looked closer, there were ones I had never even noticed, let alone knew what they were. So, I spent an hour trying to figure out one or two. I already had given common names to some, but apparently they were not commonly named the same by anybody else. In my notebook, there are several scribbled names with "?" after them. But my list was started and there were a good 25 or so "for-sure" names. I considered collecting plants to later haul over to the nice folks in Laramie. But no, by golly, this was going to be a challenge that I was going to do all by myself. I was going to learn the names and identify these "dyc's" (darn yellow composites) and weeds all by myself.

*Continued, next page - p. 4*

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### Glimpses from the 2005 Annual Meeting



Have you ever traveled in a pack of compulsive botanists? Katherine Zacharkevics, WNPS, and Don Farrar, visiting *Botrychium* researcher (University of Northern Iowa), share a light moment at the 2005 WNPS annual meeting over a newly-minted sign: "CAUTION, will brake for plants."

*By B. Heidel*



Tour-goers break into a spontaneous huddle over *Botrychium* species on a mesic open slope of Black Hills montane meadow, a habitat not previously known for harboring *Botrychium* species in Wyoming.

*By Karen Hunter.*

On a memorable Memorial weekend, attendees came from four states to the 2005 Wyoming Native Plant Society annual meeting in the Black Hills, and got a preview of spring and the latest *Botrychium* (moonwort) discoveries in the Wyoming. ...Watch for a future report on *Botrychium* additions to the state flora!

I continued doing the checklist project with chores. One Saturday morning in early July, on one of those Wyoming days with NO wind and clear skies, I went to work on a fence, notebook in hand. It is a fence I have been working on at various stages for about 10 years. I am building a new fence but wanted to use at least some of the wire off of the old fence for the new one. This is a pretty complex procedure because you cannot just take down the old one fence and build a new one, especially at my rate. It seems I never think to go work on this thing when there are not cows on one side of the fence or the other. I thought I might get away with taking the bottom wire off of the old one and roll it up. The bottom wire is actually a new wire put on in the middle of the last century, to keep out sheep. So it is the bottom 5<sup>th</sup> wire of a 4 wire semi-cowproof barb wire fence. First you have to pull all of the staples and take off all of the baling wire that for the last 40 plus years has been used to tie the wire onto stays, and posts. Then, pull it up out of the sagebrush and wild rose. Then you start rolling this wire up in a roll about 3 foot in diameter, heading back toward the place where the new fence begins. It gets pretty heavy right away, so you have to roll it along on the ground all the while trying to keep it from flopping out of the roll.

I was feeling very thrifty on this fine day and begin to think that few of my colleagues in the ranching business would be doing such time-consuming labor that was beginning to make my back sore, or the checklist project in tandem. As it happens, that very evening there was to be a rather large awareness/fund raising gathering for an agricultural based land trust on the other side of the valley. The governor was to be there as were many prominent folks from around the state to celebrate our ranching heritage and try to generate interest in conservation easements. I began to wonder, as I was trying to conserve energy with still a quarter mile of wire to be rolled, what these cowboy-heritage-saving folks would think if they saw me now. I wondered how the traditions that have had a huge impact on all of the land of the west could conserve wire and plants, let alone land. Anyway, here I was, conserving used sheep-rubbed barb wire while people gathered from all walks of ranching and residency, from ranch houses, condos, second and third homes.

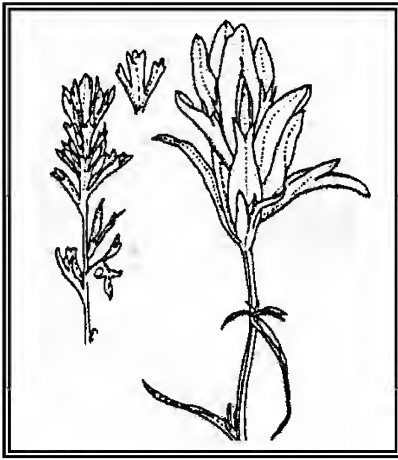
About half way along that last quarter mile stretch, where my back was really beginning to ache, I noticed this little pinkish flower. I'm sure it was right there the two previous times I was there to pull staples. But now it was suddenly impaled between two flopping loops of barb wire. I backed up a bit and laid my roll down. Here was a pretty specimen of *Penstemon laricifolius* var. *laricifolius*. Now, I had never seen this plant anywhere near here. The white ones grow over in the Laramie Plains and the closest pink ones I'd seen were up at Gas Hills. But here it was, and when I got to looking around a bit, there were dozens of 'em. Why had I never noticed this plant before? Was it because of this year's moisture, or was it because of my sore back bent over rolling up of barb wire? I was kinda excited, but there was no one at the gathering that night I felt I could talk to about my find. So, I converted the incident and endeavor to newsletter fodder.

I seriously doubt this particular acreage of ours, even with its fine new fence and a plant checklist, would ever sprout trendy condos or trophy homes. This is actually a true "back 40". It takes an hour to travel the seven miles from the house, whether you ride a horse or drive the pickup, just to get to the place.

The ongoing plant checklist project has given me the occasion to notice and reflect on what it is that binds me to this land. I sorta focus between the wires. It has shown me the subtle diversity of our discounted sagebrush steppe, and the obvious lush species totals in the bottom land meadows.

I will arrange the list according to family in alphabetic order. I would like to include common name and the location description. It would be nice to also have a photo too, but the best gallery is in the raw.

This particular spread has a conservation easement on it already. -One that hopefully will protect and conserve pretty pink flowers as well as all of the other natural aspects. I hope the used barb wire serves another 50 more years protecting our green side of the fence, and the heritage protected is one that sustains what has been here long before a list of plants was ever started, and for that matter, barb wire. ME



Wyoming Native Plant Society  
**2006 Markow Botany Research Scholarship**

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***Applications are due by 27 January 2006.***

*Scholarships will be awarded in March, 2006.*

Electronic copies of the scholarship application are also posted on the WNPS homepage at:  
[www.uwyo.edu/wyndd/wnps/wnps\\_home.htm](http://www.uwyo.edu/wyndd/wnps/wnps_home.htm)

The Wyoming Native Plant Society was established in 1981 for the purpose of encouraging appreciation and knowledge of the native flora of Wyoming. Towards this end, the Society promotes research on native plants and habitats in Wyoming through its annual scholarship program. One to three scholarships in the amounts of \$200-\$500 are awarded each year to undergraduate or graduate students conducting research in Wyoming. Projects may address any aspect of vascular and nonvascular botany, including floristics, taxonomy, ecology, genetics, plant geography, range science, population biology, physiology, paleontology, and mycology. This scholarship is open to all graduate and undergraduate students conducting botany research in Wyoming. It is dedicated to Stuart Markow, who epitomized dedication and excellence in botany.

2006 Scholarship Application – Cover page

Name \_\_\_\_\_

Address \_\_\_\_\_

School \_\_\_\_\_

Department Advisor \_\_\_\_\_

Project Title \_\_\_\_\_

Research Goals and Objectives \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

On 1-2 separate pages, please provide the following information:

- Introduction
- Methods
- Budget summary, including the intended purpose of the funding in overall project plans.
- Names, addresses, and phone numbers of two people as references

**Please send completed applications to:**

Wyoming Native Plant Society  
PO Box 2500,  
Laramie, WY 82073

**Deadline for applications: 27 January 2006.**



*Stanleya pinnata*, prince's plume; cover and frontispiece on Volume Two, Part B of ***Intermountain Flora***.

### Botanist's Bookshelf

**Intermountain Flora, Vascular Plants of the Intermountain West, U.S.A. Volume Two, Part B, Subclass Dilleniidae.** By Noel H. Holmgren, Patricia K. Holmgren, and Arthur Cronquist. 2005. The New York Botanical Garden, Bronx, NY. 488 pp. \$100.00. ISBN 0-89327-468-0.

Review by Walter Fertig

My calendar and the temperature on the thermometer said it was July, but it felt like Christmas morning when the UPS driver delivered the package from the New York Botanical Garden. Inside I found Volume 2 Part B of the *Intermountain Flora*, the seventh book in the eight-part series and the first to arrive in eight long years. This new volume covers the dicot subclass Dilleniidae and includes some of the most notoriously difficult plant families in the intermountain west (the area between the Sierra Nevada and Rocky Mountain Cordillera, including SW Wyoming), such as the mustards (Brassicaceae), willows (Salicaceae), and stickleleaves (Loasaceae). It was indeed a red-letter day!

The Intermountain Flora project was originally conceived in the 1940s by Bassett Maguire, Arthur Holmgren, and Arthur Cronquist of Utah State University and The New York Botanical Garden. Their goal was to produce a multi-volume,

illustrated treatment of the flora of the Great Basin and northern Colorado Plateau comparable in scope to the 5 volume *Vascular Plants of the Pacific Northwest* printed by the University of Washington and the 3 volume *New Britton and Brown Illustrated Flora of the Northeastern United States* produced by the New York Botanical Garden. Work on the flora began in earnest in the 1960s, leading to publication of the first volume (describing the physiography, plant geography, and botanical history of the region, as well as ferns and gymnosperms) in 1972. Subsequent volumes covering monocots, Asteridae, Fabaceae, Asteraceae, and Rosidae have appeared approximately every 3-7 years. Over much of the last three decades the work has been spearheaded by Noel and Patricia Holmgren of the New York Botanical Garden, along with their collaborators James Reveal and the now deceased Arthur Holmgren, Arthur Cronquist, and Rupert Barneby.

The hallmark of the *Intermountain Flora* has always been the outstanding technical illustrations. Several talented botanical illustrators have contributed to the series, including the now deceased Jeanne Janish (famous for her illustrations of the Flora of the Pacific Northwest and numerous books on southwestern wildflowers), Bobbi Angell, Robin Jess, and newcomer Laura Vogel. The availability of quality technical illustrations can be invaluable, particularly for



workers in the field or without access to herbarium material. Drawings complement the descriptions in the text and help highlight features that are important in distinguishing similar taxa. I have found the drawings in Volume 2B to be especially helpful in differentiating tricky species pairs in *Mentzelia* and for a number of the mustard genera. In addition, the illustrations are often things of great beauty, and the *Flora* could just as easily be marketed to aficionados of fine botanical art. The latest volume of the *Intermountain Flora* is, in my opinion, the most handsome yet in terms of the quality of illustrations, layout, and design.

Volume 2B covers 17 families in 9 orders within the subclass Dilleniidae of Cronquist's integrated system of vascular plant classification. The Dilleniidae is united by a number of somewhat arcane morphological traits (such as the presence of numerous stamens with those at the center of the flower maturing first and syncarpous ovules with parietal placentation), but is considered by Cronquist to represent a coherent, natural group that evolved independently of the Rosidae (roses and their allies), Caryophyllidae (carnations and cacti), and Hamamelidae (oaks, birches, and other amentiferous families except for willows) from the ancestral Magnoliidae (magnolia-buttercup group). Cronquist's scheme has been widely adopted by contemporary floras (such as the *Flora of North America*), but specific aspects of the system have been challenged by recent genetic and cladistic studies. In general, systematic botany is in a period of flux with numerous (and often contradictory) alternative treatments of traditional groups being proposed. While the Intermountain Flora project is too far along for major changes in the organization of families and orders to take place, the Holmgrens do a good job of addressing and referencing alternative cladistic treatments in the introduction to each family.

The authors have been less inhibited in adopting changes at the genus and species level, which may incur the displeasure of traditionalists. The most noteworthy changes have occurred in the Brassicaceae (Cruciferae), in which the genus *Arabis* has been cleaved into three parts (*Arabis*, *Turritis*, and *Boechea*), *Lesquerella* has been subsumed into *Physaria*, *Hutchinsia* has become *Hornungia*, and native species of *Thlaspi* have moved to *Noccaea*. Many (though not all) of these

changes were previously adopted by Robert Dorn in the third edition of *Vascular Plants of Wyoming* and should be somewhat familiar to Wyoming botanists. The other major change introduced in Volume 2B is the recognition of the Cleomaceae (with *Cleome* and *Polanisia*) as a new segregate family derived from the Capparaceae. Other minor changes have occurred at the species level, with a reshuffling of taxa within *Descurainia*, *Boechea*, *Salix*, *Stanleya*, and some other groups (mostly from outside Wyoming).

It deserves mention that the Salicaceae treatment was co-written by Wyoming's own Robert Dorn with Arthur Cronquist. Dorn was given the task of updating Cronquist's original draft manuscript (written prior to Cronquist's death in 1992). Although he rewrote the keys, Dorn strove to retain Cronquist's original taxonomic philosophy, even in those instances where it differed from his own (such as the treatment of *Salix lasiandra*/*S. lucida*). Dorn includes useful commentary at the end of each species account (alongside Cronquist's original notes) which helps explain any taxonomic discrepancies and provide additional useful factoids. Indeed, these notes (at the end of all species, genus, and family descriptions throughout the book) are among the most useful features of the flora (and often make for entertaining reading).

Volume 2B is a necessary addition to the library of all serious professional and amateur botanists in Wyoming. By my quick count, the book covers 215 species found in Wyoming (approximately 46% of all the species in the tome). A large percentage of these species are not illustrated or described in other regional floras (especially the Brassicaceae and Loasaceae). Likewise, the keys and species descriptions provide a nice complement to other state and regional floras that cover portions of Wyoming. Purchase of this volume will only whet ones appetite for the appearance of the final book in the series (Volume 2A covering the Magnoliidae, Hamamelidae, and Caryophyllidae), hopefully within a few short years. I'm already watching the window carefully for the next delivery of the UPS van. WF

**Growing Penstemons: Species, Cultivars and Hybrids.** By Dale Lindgren and Ellen Wilde. 2003. For the American Penstemon Society. Infinity Publishing, West Conshohocken, PA. \$17.95 + shipping; 8.5 x 11, 151 pages ISBN: 0-7414-1529-1

Review by Rick Dunne

*Growing Penstemons* has a completeness to it that I have craved for a long time. I particularly appreciated its section on taxonomic nomenclature for penstemons at the beginning of the book as well as the chatty descriptions of each species. It's more than just another pretty taxonomy book for it includes discussions of species specific seed dormancy, the known range of horticultural success, as well as fairly clear methods for breaking dormancy. At the end are several appendixes which list penstemon by ease of cultivation, occurrence by State and an easy to visualize appendix on the classification of the genus. Its later chapters on plant propagation, diseases and cultural practices are the most accurate and comprehensive I have seen. The discussion on the role of soils types, drainage and watering protocols is a must for anyone considering growing penstemons. The book is not a complete library, lacking good pictures, but if added to *Northwest Penstemons*, by Dee Strickler, (Flower Press 1997) one would have the excellent text of Lindgren and Wilde along with the excellent photographs of Strickler for a very good reference set.

There are shortcomings in the book both from what we think we know, and from the standpoint of extrapolating what we know across a genus with many different characteristics. For instance, discussion of the dormancy of specific species has to take into account variations due to environmental conditions during seed formation as well as variations in seed from different locations. My experience with *P. eatonii* and *P. angustifolia* shows that dormancy can vary greatly in seed from the same population over successive years depending on environmental conditions present during seed formation. The amount of cold/moist stratification needed to break dormancy has ranged from 10-16 weeks in firecracker penstemon grown

at our farm in Wyoming. Dormancy and stratification data when published in a book should be accompanied by an explanation regarding known ranges of dormancy within a species. Sometimes I feel I'm looking at conclusions based upon insufficient data, such as a series of germination tests on one or two seed lots. I have never had *eatonii* germinate in 8 weeks as stated in this book. Rather than targeting a time in weeks for germination, it is more helpful to me to know that radicle elongation defines the end of dormancy. This is a better tool than stratification dates for pulling seed out of stratification. Likewise, given the variation in dormancy within the same seed lot, I find that many seeds are not ready to germinate for many weeks after the first seed germinates. Uniformity of germination would be a useful tool for penstemon growers. Generally, as dormancy goes up, uniformity of germination goes down. As a commercial seed producer, I often allow the first ten or fifteen percent of seeds to germinate vigorously before sowing the remainder. I like to aim for the 70%-80% of the seed in the middle of the germination spread rather than plant to the first seeds that germinate. This rule of thumb varies with expected dormancy. With a fast germinator like *P. procerus*, I'll plant as soon as the first radicle emerges.

With the intermountain and high plains species I deal with, there is much damage to be done by sowing seeds before they are ready to germinate. Though poorly understood, secondary dormancy can be produced by warming penstemon seed too soon, and secondary dormancy is very tough to deal with. When planting seed I differ from the authors in a significant way: I never place seeds exposed on top of the soil in the sun, (Ch5 P115), but always make sure to place a quarter inch layer of fine vermiculite on top of the seed and keep the pots in the shade if possible. This protects the seed from drying out and equally important, it protects the seed from high temperatures encountered from direct exposure to sun. In my greenhouse I always sow penstemon first, in late January or early February and deliberately keep temperatures at or below 40 degrees until I have satisfactory germination. High temperature during germination is deadly for some penstemons and high temperature could be as low as 50 degrees! Next to premature sowing, I believe high temperature is my most frequent cause of seeding failure. Keep the seeds moist until



they germinate at then withdraw the water and use it sparingly thereafter. Also, avoid excessive humidity. Given this protocol and disease free soil, damp-off is unlikely to be a problem. Our Penstemons do not necessarily like high organic content in soil, so watering frequency must be adjusted for the watering absorbing capacity of the soil.

The book suggests a common method for breaking dormancy by placing seeds in moist pots outside during the winter for germination in the spring. This works well in temperate climates, but most areas of Wyoming get very limited winter stratification. At my place I get one day of moist stratification on Nov. 3<sup>rd</sup> and a few days of stratification in late March. Frozen seed does not stratify so this method should be avoided with very dormant species such as *P. eatonii* and *P. cyananthus*. Less dormant species such as *P. procerus* and *P. strictus* will usually stratify adequately in the spring, but again, it is important not to let the seed get too warm in the sun if you have them in pots. While after-ripening of six months to one year, (Ch 5), is helpful for less dormant species, I have not found year old seed of the species I work with to show significant loss of dormancy. For a good discussion on after-ripening seed and temperatures see ***Seed Germination, Theory and Practice***, by Norman Deno, 1993.

My own methods are adapted for production of 25,000 to 50,000 penstemon tublings per year. When I stratify, it's usually several hundred thousand seeds at a time. I don't place seed in a medium for stratification, but place

imbibed seed in ziploc baggies so I can keep a close eye on them. Seeds are checked daily for excess moisture or insufficient moisture. A slightly moist paper towel can help buffer the air inside the ziploc. When planting, I accept the loss of the first 10% of seeds that have already germinated and focus on the majority of seeds almost ready to germinate. You may find parts of this method adaptable to very small packets of rare or valuable seed. Small quantities in small baggies can be a little trickier because the seed mass is too small to act as a significant moisture buffer and thus requires more attention.

Two miscellaneous items of note. After growing penstemons in our garden for over twenty years, I have seen no durable hybridization. Also, I struggled for many years with *P. palmerii*. It bloomed too late to produce viable seed and then winterkilled. A few plants struggled through from year to year and I expected the population to die out. About five years ago I began to notice earlier blooming progeny rapidly colonize an open area in my garden. Now this gorgeous species is becoming abundant, though its stature is still much smaller than the plants I collected from in southern Utah twenty years ago.

What I write here is based upon experience, and many personal germination trials. It doesn't qualify as science, but then there is very little science available for the culture of penstemon.

***Growing Penstemons*** is the best book I've seen to start with, but your own experience will have to fill in the many gaps such publications leave. RD

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### *At your fingertips...*

Digital Representations of Tree Species Range  
Maps from "Atlas of United States Trees"

North American range maps of all United States tree species, as tirelessly prepared by Elbert Little of the USDA Forest Service, are being digitized and posted in collaboration with the USDI Geological Survey for use in vegetation-climate modeling studies. These digital map files are available in ArcView® shapefiles for download at:

<http://climchange.cr.usgs.gov/data/atlas/little/>

### Kew World Grass Species Descriptions Database

The geo-referenced Kew World Grass Species Descriptions and Synonymy database is now posted to produce checklists for geographical regions, genera or both, all with links to taxonomic species descriptions and synonymy. It is cited as: Clayton, W.D., Harman, K.T. and Williamson, H. (2002 onwards). World Grass Species: Descriptions, Identification, and Information Retrieval. It is posted at:

<http://www.kew.org/data/grasses-db.html>.

Announcing Cooperative Extension Publication:

***Guidelines for the Master Gardener Program in Wyoming*** is now available online at:  
[http://uwyo.edu/UWCES/Master\\_Gardener\\_Main.asp](http://uwyo.edu/UWCES/Master_Gardener_Main.asp)  
or at your local UW Cooperative Extension office.

The Master Gardener Program is a way to provide citizens with information and tips on horticultural and pest management topics. A voluntary program, people with horticultural interests and abilities take 40 hours of Master Gardener classroom, laboratory, and field instruction during the spring.

The program began in the United States in the early 1970s in Seattle, Washington. Each state has a Master Gardener Program. Each Program is a part of the land-grant university and Cooperative Extension in that state. In Wyoming, the Master Gardener Program is part of UW Cooperative Extension at the University of Wyoming.

Some counties in Wyoming have Master Gardener programs; others simply have horticulture training classes for interested citizens. Contact your local UW Cooperative Extension office for more details.

**The Wyoming Native Plant Society**, established in 1981, is a non-profit organization dedicated to encouraging the appreciation and conservation of the native flora and plant communities of Wyoming. The Society promotes education and research on native plants of the state through its newsletter, field trips, and annual student scholarship award. Membership is open to individuals, families, or organizations with an interest in Wyoming's flora. Members receive *Castilleja*, the Society's quarterly newsletter, and may take part in all of the Society's programs and projects, including the annual meeting/field trip held each summer. Dues are \$7.50 annually. To join or renew, return this form to:

**Wyoming Native Plant Society  
P.O. Box 2500  
Laramie, WY 82073**

Name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Email: \_\_\_\_\_

\_\_\_ \$7.50 Regular Membership  
\_\_\_ \$15.00 Scholarship Supporting Member  
(*\$7.50 goes to the Markow scholarship fund*)



**Wyoming Native Plant Society  
P.O. Box 2500  
Laramie, WY 82073**